

CRYSTAL OSCILLATOR PROGRAMMABLE

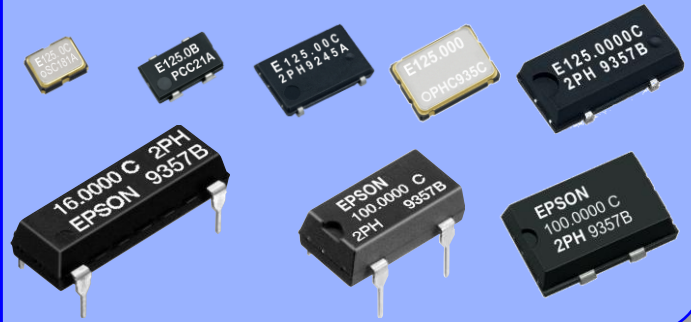
SG-8002 series

- Frequency range : 1 MHz to 125 MHz
- Supply voltage : 3.0 V / 3.3 V / 5.0 V
- Function : Output enable(OE) or Standby(\overline{ST})
- Short mass production lead time by PLL technology.
- SG-Writer available to purchase, please contact Epson Toyocom or local sales representative.



CE, LB, CA

Product Number (please contact us)



Specifications (characteristics)

Item	Symbol	Specifications *2			Conditions / Remarks
		PT / ST	PH / SH	PC / SC	
Output frequency range	f_0	1 MHz to 125 MHz		—	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ (except SG-8002LB)
		—	1 MHz to 80 MHz	—	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ (SG-8002LB only)
		—	—	1 MHz to 125 MHz	$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$
		—	—	1 MHz to 66.7 MHz	$V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$
Supply voltage	V_{CC}	4.5 V to 5.5 V		2.7 V to 3.6 V	
Storage temperature	T_{stg}	-55 °C to +125 °C (SG-8002CA / JF / JA / DC / DB)			Store as bare product.
		-55 °C to +100 °C (SG-8002JC)			
		-40 °C to +125 °C (SG-8002CE / LB)			
Operating temperature	T_{use}	-20 °C to +70 °C / -40 °C to +85 °C			*1
Frequency tolerance	f_{tol}	B: $\pm 50 \times 10^{-6}$, C: $\pm 100 \times 10^{-6}$			-20 °C to +70 °C
		M: $\pm 100 \times 10^{-6}$		M: $\pm 100 \times 10^{-6}$	-40 °C to +85 °C (except SG-8002JC) *3
		—	L: $\pm 50 \times 10^{-6}$	L: $\pm 50 \times 10^{-6}$	-40 °C to +85 °C (SG-8002LB only) *3
Current consumption	I_{CC}	40 mA Max. (SG-8002CE)		28 mA Max.	No load condition, Max. frequency
		30 mA Max. (SG-8002LB)			
		45 mA Max. (SG-8002CA / JF / JC / JA / DC / DB)			
Output disable current	I_{dis}	30 mA Max.		16 mA Max.	OE=GND (PT,PH,PC) (except SG-8002LB)
		—	25 mA Max.	16 mA Max.	OE=GND (PH,PC) (SG-8002LB only)
Stand-by current	I_{std}	50 μA Max.			\overline{ST} =GND (ST,SH,SC)
Symmetry *1	SYM	40 % to 60 %	—		TTL load: 1.4 V, Max. load condition (except SG-8002LB)
		—	40 % to 60 %		CMOS load: 50 % VCC level, Max. load condition (except SG-8002LB)
		—	40 % to 60 %	—	50 % V_{CC} , $L_{CMOS}=15 \text{ pF}$, $\leq 80 \text{ MHz}$ (SG-8002LB)
		—	—	40 % to 60 %	50 % V_{CC} , $L_{CMOS}=15 \text{ pF}$, $V_{CC}=3.0 \text{ V to } 3.6 \text{ V}$, $\leq 125 \text{ MHz}$ (SG-8002LB)
		—	—	40 % to 60 %	50 % V_{CC} , $L_{CMOS}=15 \text{ pF}$, $V_{CC}=2.7 \text{ V to } 3.6 \text{ V}$, $\leq 66.7 \text{ MHz}$ (SG-8002LB)
High output voltage	V_{OH}	45 % to 55 %			*1
Low output voltage	V_{OL}	$V_{CC}-0.4 \text{ V Min.}$			$I_{OH}=-16 \text{ mA}$ (PT,ST,PH,SH) , -8 mA (PC,SC)
Output load condition (TTL) *1	L_{TTL}	5 TTL Max.	—		$I_{OL}=16 \text{ mA}$ (PT,ST,PH,SH) , 8 mA (PC,SC)
		5 TTL Max.	—		Max. frequency and Max. Supply voltage (SG-8002CE / CA / JA / DC / DB)
Output load condition (CMOS) *1	L_{CMOS}	15 pF Max.			Max. frequency and Max. Supply voltage (SG-8002CE / JF / JC)
		—	15 pF Max.		Max. frequency and Max. Supply voltage (SG-8002LB)
		15 pF Max.	25 pF Max.	15 pF Max.	Max. frequency and Max. Supply voltage (SG-8002CA / JA / DC / DB)
Output enable / disable input voltage	V_{IH}	2.0 V Min.		70 % VCC Min.	OE terminal or \overline{ST} terminal
	V_{IL}	0.8 V Max.		20 % VCC Max.	
Rise / Fall time *1	t_r / t_f	4 ns Max.	—		TTL load: 0.4 V to 2.4 V level (except SG-8002LB)
		—	3 ns Max.		CMOS load: 20 % VCC to 80 % VCC level
Start-up time	t_{str}	10 ms Max.			Time at minimum supply voltage to be 0 s
Frequency aging	f_{aging}	$\pm 5 \times 10^{-6}$ / year Max.			+25 °C, $V_{CC}=5.0 \text{ V} / 3.3 \text{ V}$ (PC,SC) First year

*1 Operating temperature, the available frequency, symmetry, output load conditions and rise/fall time, please refer to "Outline specifications" page.

*2 PLL-PLL connection & Jitter specification, please refer to "Jitter specifications and characteristics chart" page.

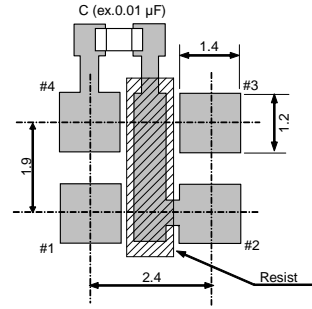
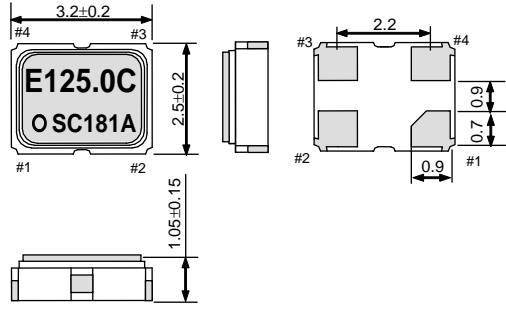
*3 Refer to "Outline specifications" (Frequency range) for "M" and "L" tolerance availability. Checking possible by the Frequency checking program.



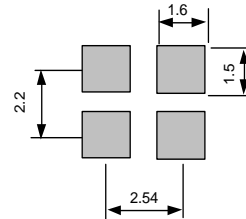
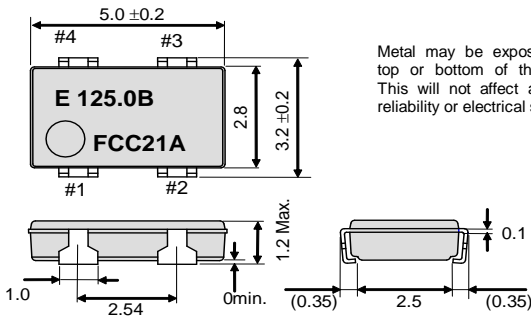
External dimensions and Recommended footprint

(Unit:mm)

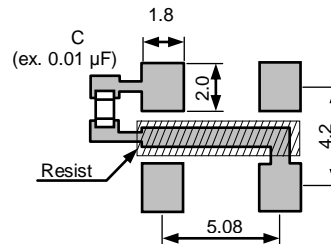
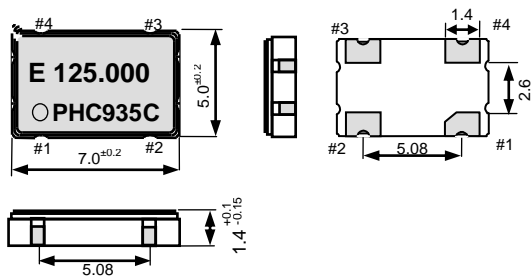
SG-8002CE Ceramic SON 4pin 3.2x2.5x1.05 mm



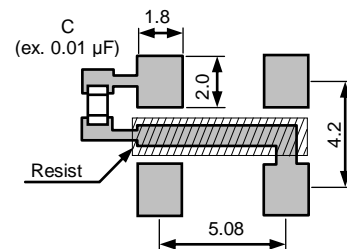
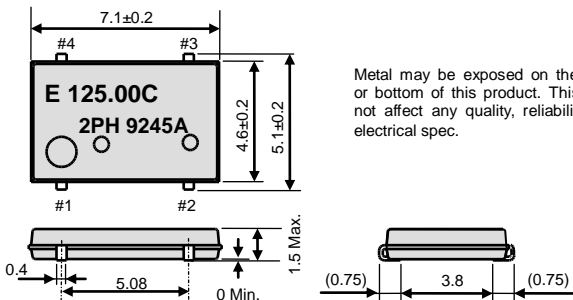
SG-8002LB SOJ 4pin 5.0x3.2x1.2 mm



SG-8002CA Ceramic SON 4pin 7.0x5.0x1.4 mm



SG-8002JF SOJ 4pin 7.1x5.1x1.5 mm



Note.

- OE Pin (PT, PH, PC)
- OE Pin = "H" or "open": Specified frequency output.
- OE Pin = "L": Output is high impedance.

- ST Pin (ST, SH, SC)
- ST Pin = "H" or "open": Specified frequency output.
- ST Pin = "L": Output is low level (weak pull - down), oscillation stops.

Pin map

Pin	Connection
1	OE or ST
2	GND
3	OUT
4	VCC

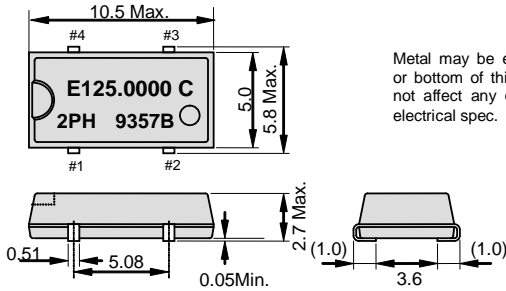
To maintain stable operation, provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc - GND).



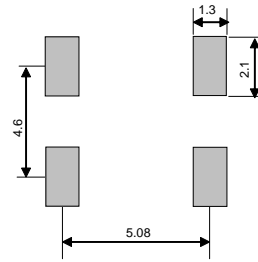
External dimensions and Recommended footprint (Continued)

(Unit:mm)

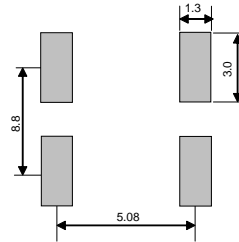
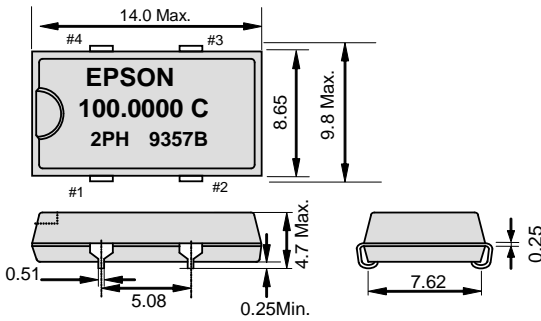
SG-8002JC SOJ 4pin 10.5x5.8x2.7 mm Package and pin compatible with SG-636.



Metal may be exposed on the top or bottom of this product. This will not affect any quality, reliability or electrical spec.



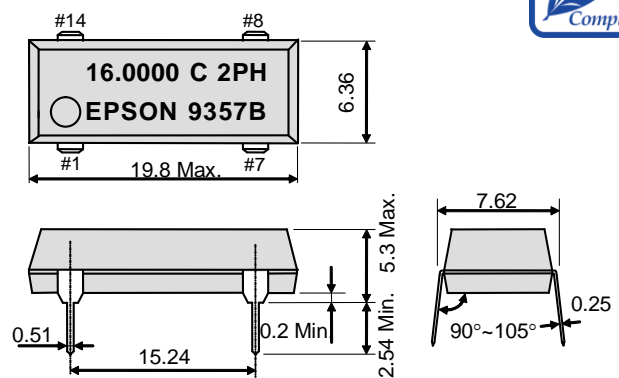
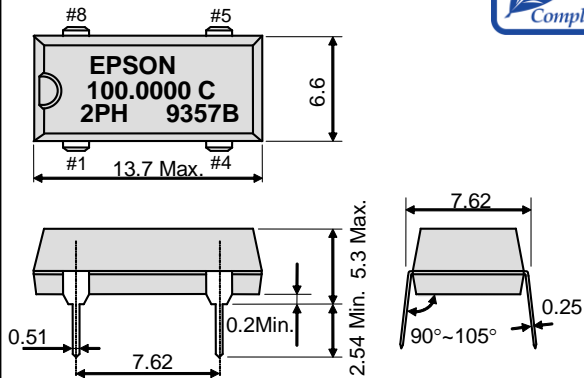
SG-8002JA SOJ 4pin 14.0x9.8x4.7 mm Package and pin compatible with SG-615.



SG-8002DC DIP half size



SG-8002DB DIP full size



Note.

OE Pin (PT, PH, PC)
OE Pin = "H" or "open": Specified frequency output.
OE Pin = "L": Output is high impedance.

\overline{ST} Pin (ST, SH, SC)
ST Pin = "H" or "open": Specified frequency output.
ST Pin = "L": Output is low level (weak pull - down), oscillation stops.

Pin map

Pin	Connection
1	OE or \overline{ST}
2	GND
3	OUT
4	VCC

Pin map: SG-8002DC

Pin	Connection
1	OE or \overline{ST}
4	GND
5	OUT
8	VCC

Pin map: SG-8002DB

Pin	Connection
1	OE or \overline{ST}
7	GND
8	OUT
14	VCC

To maintain stable operation, provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc - GND).

Products number

(Please contact us for each product.)

SG-8002CE: Q3321CExxxxx00
SG-8002LB: Q3323LBxxxxx00
SG-8002CA: Q3309CAx0xxxx00
SG-8002JF: Q3308JF1xxxx00

SG-8002JC: Q3307JC1xxxx00
SG-8002JA: Q3306JA1xxxx00
SG-8002DC: Q3204DC1xxxx00
SG-8002DB: Q3203DB1xxxx00



SG-8002 Series Outline of specifications

Model		Supply voltage	Operating temperature	Output load condition	Symmetry	Output rise time / Output fall time
SG-8002CE	PT/ST	4.5 V to 5.5 V	-20 °C to +70 °C	5TTL+15pF	40 % to 60 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤125 MHz)	2.0 ns Max. (0.8 V to 2.0 V, L_TTL=Max.)
			-40 °C to +85 °C		45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤66.7 MHz)	
	PH/SH	-20 °C to +70 °C	15 pF (f0≤125 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS=Max.)	
25 pF (f0≤100 MHz)			45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤66.7 MHz)			
PC/SC	-40 °C to +85 °C	15 pF	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤27.0 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS=Max.)		
			45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤27.0 MHz)			
SG-8002LB	PH/SH	4.5 V to 5.5 V	-40 °C to +85 °C	15 pF 25pF (f0≤50 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤80 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS=Max.)
					45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤50 MHz)	
PC/SC	-40 °C to +85 °C	15 pF	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS=Max.)		
			45 % to 55 % (50 % VCC, L_CMOS=15 pF, f0≤40 MHz)			
SG-8002JF	PT/ST	4.5 V to 5.5 V	-20 °C to +70 °C	5TTL+15 pF (f0≤90 MHz)	40 % to 60 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤90 MHz)	2.0 ns Max. (0.8 V to 2.0 V, L_CMOS≤25pF)
				15 pF (f0≤125 MHz)	45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤66.7 MHz)	
	PH/SH	-20 °C to +70 °C	15 pF (f0≤125 MHz)	40 % to 60 % (1.4 V, L_CMOS=15 pF, f0≤40 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS≤25pF)	
				25 pF (f0≤90 MHz)		45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤66.7 MHz)
	PC/SC	-40 °C to +85 °C	15 pF (f0≤40 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz)	4.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS=Max.)	
				30 pF (f0≤40 MHz)		45 % to 55 % (50 % VCC, L_CMOS=30 pF, f0≤40 MHz)
SG-8002CA	PT/ST	4.5 V to 5.5 V	-20 °C to +70 °C	5TTL+15pF (f0≤125 MHz)	40 % to 60 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤125 MHz)	2.0 ns Max. (0.8 V to 2.0 V, L_CMOS or L_TTL=Max.)
				25 pF (f0≤66.7 MHz)	45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤66.7 MHz)	
SG-8002JA	PH/SH	-20 °C to +70 °C	15 pF (f0≤40 MHz)	5 TTL+15 pF (f0≤40 MHz)	40 % to 60 % (1.4 V, L_CMOS=15 pF, f0≤55.0 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS≤25pF)
				15 pF (f0≤55 MHz)	45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤40.0 MHz)	
SG-8002DB	PC/SC	-40 °C to +85 °C	15 pF (f0≤125 MHz)	25 pF (f0≤66.7 MHz)	40 % to 60 % (50 % VCC, L_CMOS=25 pF, f0≤125 MHz)	4.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS=Max.)
				50 pF (f0≤66.7 MHz)	45 % to 55 % (50 % VCC, L_CMOS=50 pF, f0≤66.7 MHz)	
SG-8002DC	PC/SC	-40 °C to +85 °C	15 pF (f0≤55 MHz)	15 pF (f0≤40 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤55.0 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS≤15pF)
				30 pF (f0≤40 MHz)	45 % to 55 % (50 % VCC, L_CMOS=30 pF, f0≤40 MHz)	
SG-8002JC	PT/ST	4.5 V to 5.5 V	-20 °C to +70 °C	5TTL+15 pF (f0≤90 MHz)	40 % to 60 % (1.4 V, L_CMOS=15 pF, f0≤125 MHz)	2.0 ns Max. (0.8 V to 2.0 V, L_CMOS or L_TTL=Max.)
				15 pF (f0≤125 MHz)	45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤66.7 MHz)	
	PH/SH	-20 °C to +70 °C	15 pF (f0≤125 MHz)	25 pF (f0≤90 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS≤25pF)
				25 pF (f0≤40 MHz)	45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤66.7 MHz)	
	PC/SC	-20 °C to +70 °C	15 pF (f0≤40 MHz)	15 pF (f0≤90 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz)	4.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS=Max.)
				30 pF (f0≤40 MHz)	45 % to 55 % (50 % VCC, L_CMOS=30 pF, f0≤40 MHz)	
SG-8002JG	PH/SH	-20 °C to +70 °C	15 pF	15 pF	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤66.7 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC, L_CMOS=Max.)
				40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤66.7 MHz)		

▶ TABLE OF FREQUENCY RANGE

Model	Supply voltage	Frequency	Frequency tolerance
SG-8002CE	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz
	PH/ SH		1.0 MHz to 27 MHz
	PC/SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz
SG-8002LB	PH/ SH	4.5 V to 5.5 V	1.0 MHz to 80 MHz
			1.0 MHz to 27 MHz
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz
SG-8002JF	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz
			PH/ SH
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz
SG-8002CA	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz
			PH/ SH
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz
SG-8002JA	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz
			PH/ SH
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz
SG-8002DB	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz
			PH/ SH
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz
SG-8002DC	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz
			PH/ SH
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz
SG-8002JC	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz
			PH/ SH
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz

Frequency tolerance: B:±50×10⁻⁶ (-20 °C to +70 °C), C:±100×10⁻⁶ (-20 °C to +70 °C), M:±100×10⁻⁶ (-40 °C to +85 °C), L:±50×10⁻⁶ (-40 °C to +85 °C)



SG-8002 series Jitter specifications and characteristics chart

■ PLL-PLL connection

Because we use a PLL technology, there are a few cases that the jitter value will increase when SG-8002 is connected to another PLL-oscillator.

In our experience, we are unable to recommend these products for the applications such as telecom carrier use or analog video clock use. Please be careful checking in advance for these application (Jitter specification is Max.250 ps/CL=15 pF)

Jitter Specifications

Model	Supply Voltage	Jitter Item	Specifications	Remarks
PT / PH ST / SH	5.0 V ±0.5 V	Cycle to cycle	150 ps Max.	33 MHz ≤ f ₀ ≤ 125 MHz, L_CMOS=15 pF
			200 ps Max.	1.0 MHz ≤ f ₀ < 33 MHz, L_CMOS=15 pF
		Peak to peak	200 ps Max.	33 MHz ≤ f ₀ ≤ 125 MHz, L_CMOS=15 pF
			250 ps Max.	1.0 MHz ≤ f ₀ < 33 MHz, L_CMOS=15 pF
SC / PC	3.3 V ±0.3 V	Cycle to cycle	200 ps Max.	1.0 MHz ≤ f ₀ ≤ 125 MHz, L_CMOS=15 pF
		Peak to peak	250 ps Max.	1.0 MHz ≤ f ₀ ≤ 125 MHz, L_CMOS=15 pF

■ Remarks on noise management for power supply line

We do not recommend inserting filters or other devices in the power supply line as the counter measure of EMI noise reduction.

This device insertion might cause high-frequency impedance high in the power supply line and it affects oscillator stable drive.

When this measure is required, please evaluate circuitry and device behavior in the circuit and verify that it will not affect oscillation.

Start up time (0 % V_{cc} to 90 % V_{cc}) of power source should be more than 150 μs.

■ SG-8002 series Characteristics chart

